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## Bulk $2a \times 2b \times c$ Superstructure in TCNQ-treated (Bi, Pb)-2223 Cuprates

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### Abstract

By reaching (Bi, Pb)-2223 cuprate superconductors with TCNQ (7,7,8,8-tetracyanoquinodimethane) in a sealed and evacuated pyrex ampoule at 300°C for 14 days, we have observed a superstructure of  $2a \times 2b \times c$  in a bulk form according to X-ray diffraction and transmission electron microscope analyses. The origin of the  $2a \times 2b \times c$  superstructure could be attributed to an ordering of oxygen vacancies in the  $\text{CuO}_2$  layers and also likely in the SrO layers. Electrical conductivity of this TCNQ treated (Bi, Pb)-2223 cuprate shows a metal-like temperature dependence with high resistivity (102~103  $\Omega \text{ cm}$ ), and a relatively rapid resistivity drop at ca. 11.7 K.